REMARKS

Claims 1-10 are all the claims pending in the application.

Applicant thanks the Examiner for acknowledging Applicant's claim for foreign priority under 35 U.S.C. § 119, and for placing the certified copies of the priority documents in the record of the file.

Applicant also thanks the Examiner for initialing and returning Applicant's Information Disclosure Statement filed on February 4, 2000.

Rejections Under 35 U.S.C. § 112, second paragraph

The Examiner rejects claims 1, 3, 4, 8 and 9 under 35 U.S.C. § 112, second paragraph, as being indefinite. Applicant amends claims 1, 3, 4, 6, 8 and 9 to correct minor typographical and grammatical errors and to correct the antecedent basis problems noted by the Examiner. Applicant notes that these amendments are for precision of language only and do not narrow the claims beyond their original scope.

Claim Rejections under 35 U.S.C. § 103(a)

The Examiner rejects claims 1, 2, 6, and 7 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,233,459 B1 to Sullivan et al. in view of U.S. Patent 5,710,977 to Nakazawa and U.S. Patent 5,910,648 to Shou et al. Applicant respectfully traverses this rejection. Claims 1 and 6 are independent claims on which claims 2 and 7 depend, respectively.

Applicant's arguments traversing the Examiner's rejection will therefore focus on independent claims 1 and 6.

The combination of Sullivan, Nakazawa, and Shou does not teach, disclose, or suggest all of the features of Applicant's invention as claimed in claims 1 and 6. One of the features of Applicant's claimed invention is "judging means which specifies an arrival direction of each of the radio waves of the mobile stations on the basis of the demodulation signal and which produces the demodulation signal for each of the mobile stations; and fading compensation means which performs a RAKE combination from the demodulation signal for each of the mobile stations"(see claims 1 and 6). The Examiner acknowledges that Sullivan does not disclose these features as required by claims 1 and 6. Nakazawa does not disclose or suggest RAKE processing at all. However, the Examiner alleges that Shou discloses the fading compensation means as claimed in claims 1 and 6. Applicant respectfully disagrees.

Shou does not disclose or suggest a fading compensation means which performs a RAKE combination from the demodulation signal for each of the mobile stations. In fact, Shou does not disclose performing RAKE processing on signals received from mobile stations as the claims require, but rather discloses processing of signals transmitted from the base station (Shou, column 5, lines 24-40).

Furthermore, Shou discloses that the demodulation of the signals received from the base station occurs after the signals are given RAKE processing (Shou, column 9, lines 52-56). Because Shou performs RAKE processing on signals received from a base station before those

signals are demodulated, Shou cannot perform "a RAKE combination from the demodulation signal for each of the mobile stations" as required by claims 1 and 6.

Because the combination of Sullivan, Nakazawa, and Shou does not teach, disclose or suggest all of the features of Applicant's invention as claimed in claims 1 and 6, the Examiner's rejection of these claims under §103(a) should be withdrawn. Claims 2 and 7 are allowable at least by virtue of their dependence on claims 1 and 6, respectively.

Furthermore, there is no suggestion in any of the Sullivan, Nakazawa, and Shou references that would motivate one of ordinary skill in the art to combine these references as proposed by the Examiner. In fact, the devices and systems disclosed in the references cannot be combined without rendering one or more of them inoperable.

For example, Nakazawa discloses an apparatus for measuring multipath propagation characteristics of signals subjected to multipath fading (Nakazawa, column 1, lines 7-14). In particular, Nakazawa relates to the multipath fading of transmitted waves originating from a plurality of transmitters in different spatial positions (Nakazawa, column 2, lines 14-30). Nakazawa does not use RAKE processing to analyze the multipath fading and propagation characteristics of the signals.

By contrast, Shou, addresses the problem of multipath fading with respect to a single base station transmitter whose position is fixed (Shou, column 5, lines 17-24). There is no suggestion in Shou that would motivate applying its RAKE processing method in a system with multiple transmitters or in a system in which the transmitters can move. Furthermore, there would be no

motivation to combine the RAKE system of Shou with that of Nakazawa, because the system of Nakazawa is capable of determining the multipath fading and propagation characteristics without using RAKE processing. Furthermore, there is no suggestion that the RAKE processing of Shou can be combined with the system of Nakazawa without rendering one system inoperable or without extensive experimentation and testing. Because the two systems manipulate the same incoming signals in different ways, it is likely that the two methods cannot easily be combined.

At least for these reasons, one skilled in the art of mobile communication systems would not have been motivated to combine Sullivan, Nakazawa, and Shou as the Examiner suggests to achieve Applicant's invention, nor would it have been obvious that such a combination could even be made.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows:

1. (Currently Amended) A mobile communication system ~~having~~ comprising a plurality of mobile stations and a base station ~~which includes~~, said base station comprising a plurality of antennas, a frequency shift portion, a combining portion, a receiving portion and a signal processing portion, wherein:

~~the~~ each antenna receives radio waves transmitted by the mobile stations~~,~~;

the frequency shift portion shifts the received signals with a frequency corresponding to each of the antennas~~,~~;

the combining portion ~~determines~~ combines the signal, which is shifted in frequency, as a combining signal~~,~~;

the receiving portion converts the combining signal in frequency to make an intermediate frequency signal, and converts the intermediate frequency signal into a digital signal~~,~~; and

the signal processing portion comprises~~:~~;

spreading demodulation means which demodulates the digital signal with spreading by the use of a spreading code that is compensated frequency shift component corresponding to each of the antennas and which makes a demodulation signal at every antenna~~,~~;

judging means which specifies an arrival direction of each of the radio waves of the mobile stations on the basis of the demodulation signal and which produces the demodulation signal for each of the mobile stations~~,~~; and

fading compensation means which performs a RAKE combination from the demodulation signal for each of the mobile stations~~,~~.

~~whereby the system being reduced in size and cost.~~

2. (Original) A mobile communication system claimed in claim 1, wherein:

the system utilizes a code division multiple access.

3. (Currently Amended) A mobile communication system claimed in claim 1, wherein:

the frequency shift portion ~~includes~~ comprises a plurality of amplifiers corresponding to the antennas, a plurality of mixers, and a plurality of oscillators~~,~~;

~~the~~ each amplifier amplifies a signal received at every antenna~~,~~;

~~the~~ each oscillator oscillates a frequency predetermined on the basis of a value corresponding to each of the antennas~~,~~; and

~~the~~ each mixer frequency-shifts the amplified signal with the oscillating signal.

4. (Currently Amended) A mobile communication system claimed in claim 1, wherein:

the frequency shift portion ~~includes~~ comprises a plurality of amplifiers corresponding to the antennas, a plurality of mixers, a plurality of frequency multipliers, and a single reference oscillators~~,~~;

~~the~~ each amplifier amplifies a signal received at every antenna~~,~~;

the reference oscillator oscillates a single predetermined frequency~~,~~;

~~the~~ each frequency multiplier multiplies a reference oscillating signal with a predetermined value based upon a value corresponding to each of the antennas~~,~~; and

~~the~~ each mixer frequency-shifts the amplified signal with a multiplied signal.

5. (Original) A mobile communication system claimed in claim 1, wherein:

a phase difference is retained between the received signal and the demodulation signal.

6. (Currently Amended) A mobile communication system ~~having~~ comprising a plurality of mobile stations and a base station ~~which includes~~, said base station comprising an adaptive array antenna having a plurality of antennas, a frequency shift portion, a combining portion, a single receiving portion, and a signal processing portion, wherein:

the adaptive array antenna receives radio waves transmitted by the mobile stations~~,~~;

the frequency shift portion shifts the received signal with a frequency predetermined on the basis of a value corresponding to each of the antennas~~,~~;

the combining portion determines the signal, which is shifted in frequency, as a single combining signal~~,~~;

the single receiving portion converts the single combining signal in frequency to make an intermediate frequency signal ,and converts the intermediate frequency signal into a digital signal~~,~~; and

the signal processing portion comprises~~;~~:

spreading demodulation means which demodulates the digital signal with spreading by the use of a spreading code that is compensated frequency shift component predetermined on the basis of a value corresponding to each of the antennas and which makes a demodulation signal at every antenna~~,~~;

judging means which specifies an arrival direction of each of the radio waves of the mobile stations on the basis of the demodulation signal and which produces the demodulation signal for each of the mobile stations~~,~~; and

fading compensation means which performs a RAKE combination from the demodulation signal for each of the mobile stations.~~, whereby the system being reduced in size and cost~~.

7. (Original) A mobile communication system claimed in claim 6, wherein:

the system utilizes a code division multiple access.

8. (Currently Amended) A mobile communication system claimed in claim 6, wherein:

the frequency shift portion ~~includes~~ comprises a plurality of amplifiers corresponding to the antennas, a plurality of mixers, and a plurality of oscillators~~,~~;

~~the~~ each oscillator oscillates a frequency predetermined on the basis of a value corresponding to each of the antennas~~,~~; and

~~the~~ each mixer frequency-shifts the amplified signal with the oscillating signal.

9. (Currently Amended) A mobile communication system claimed in claim 6, wherein:

the frequency shift portion comprises ~~includes~~ a plurality of amplifiers corresponding to the antennas, a plurality of mixers, a plurality of frequency multipliers, and a single reference oscillators~~,~~;

~~the~~ each amplifier amplifies a signal received at every antenna~~,~~;

the reference oscillator oscillates a single predetermined frequency~~,~~;

~~the~~ each frequency multiplier multiplies a reference oscillating signal with a predetermined value based upon a value corresponding to each of the antennas~~,~~; and

~~the~~ each mixer frequency-shifts the amplified signal with a multiplied signal.

10. (Original) Mobile communication system claimed in claim 6, wherein:

a phase difference is retained between the received signal and the demodulation signal.